

We claim:

1. A method of incrementally stretching a sheet material comprising the steps of
 - a. providing a flexible sheet material;
 - b. providing a forming surface having grooves formed therein;
 - c. providing a plurality of mating surfaces having fins positioned to fit within the grooves of said forming surfaces;
 - d. forming successive nips between the forming surface and the mating surfaces wherein the fins of the mating surfaces enter the grooves of the forming surface at separate locations on the forming surface;
 - e. feeding said sheet material into the successive nips while maintaining the position of said sheet material with respect to said forming surface; and
 - f. stretching said sheet material a plurality of times along lines on the sheet material by the fins entering the forming surface grooves along with said sheet material within successive nips.
2. The method of claim 1 wherein the fins of said successive mating surfaces enter the grooves of respective successive nips to a different degree providing a different amount of stretch to said sheet at different nips.
3. The method of claim 1 wherein said forming surface is a drum and said plurality of mating surfaces are satellite rolls positioned at different locations with respect to said drum.
4. The method of claim 1 wherein said forming surface is a belt and said fins comprise rolls positioned at different locations with respect to said belt.
5. The method of claim 1 wherein said sheet comprises a nonwoven web.
6. The method of claim 1 wherein said sheet comprises a film.
7. The method of claim 5 wherein said sheet comprises a laminate comprising a film and a nonwoven web.
8. The method of claim 1 wherein said sheet is stretched in the machine direction.

9. The method of claim 1 wherein said sheet is stretched in the cross-machine direction.

10. The method of claim 1 wherein said stretching is along lines having a frequency of
5 about 3 per inch to about 15 per inch.

11. The method of claim 1 wherein said sheet has a basis weight in the range of from about 10 gsm to about 150 gsm.

10 12. The method of claim 1 further including the step of separating said sheet from said support surface and returning it to said support surface at least once between at least one pair of said nips.

13. Apparatus for incrementally stretching a web with multiple impacts comprising:
15 a. means for providing a flexible web;
b. a forming surface having grooves formed therein;
c. means for depositing said flexible sheet on said forming surface;
d. a plurality of nip forming means having fins adapted to movably fit within said forming surface grooves creating a plurality of nips;
20 e. means for feeding said sheet on said forming surface into said plurality of nips;
f. means for engaging said nip forming means and said sheet on said forming surface causing said fins to enter the forming surface grooves and stretch said sheet.

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14. The apparatus of claim 13 wherein said support surface comprises an anvil roll and said nip forming means comprises a plurality of satellite rolls.

15. The apparatus of claim 13 further including means to adjust the distance that the
30 fins of said nip forming means enter said grooves.

16. The apparatus of claim 13 wherein said support surface comprises a belt.

17. The apparatus of claim 13 wherein said forming surface grooves and said nip
35 forming means fins are adapted to stretch said web in the machine direction.

18. The apparatus of claim 13 wherein said forming surface grooves and said nip forming means fins are adapted to stretch said web in the cross-machine direction.

5 19. The apparatus of claim 13 wherein the fins of at least one of said nip forming means are adapted to enter said forming surface grooves to a different extent from one end of said nip forming means to the other end in the cross machine direction of said sheet.

10 20. The apparatus of claim 13 wherein said fins have a spacing within the range of from about 3 per inch to about 15 per inch.

21. The apparatus of claim 13 further including means to separate said sheet from said forming surface and return it to said forming surface between at least one of said plurality of nips.

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22. A sheet stretched in accordance with the process of claim 1.